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Bowen

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[54] **ADHESION-PROMOTING AGENTS INCORPORATING POLYVALENT CATIONS**

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[52] **U.S. Cl.** **523/116**; 523/115; 433/228.1

[58] **Field of Search** 523/115, 116; 433/228.1; 206/635

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[57] **ABSTRACT**

Materials and methods for preparing the surface of dentin, enamel, or other natural or industrial substrates containing or capable of binding metallic ions, for adhesion of composite materials or resins, are disclosed. Preferably, the substrate is treated with an aqueous solution comprising at least one acid, acidic salt, or chelating or sequestering agent. The resultant surface is then treated with a solution comprising a solvent and at least one adhesion-promoting agent selected from the group consisting of N-phenylglycine (NPG) and derivatives and analogues thereof, and other amino acids in the form of salts and complexes of these compounds with at least one species of divalent or polyvalent cation, or diamine or polyamine, wherein the divalent and polyvalent cations are preferably selected from the group consisting of alkaline earth elements, iron, aluminum, zinc, barium, chromium, manganese, cobalt, copper, and molybdenum, and wherein the divalent and polyvalent salts and complexes for each mixture comprise between 1 and 100% of the total mixture. Finally, a solution is applied which contains at least one monomer selected from the group consisting of (1) reaction products of dianhydrides with molecules containing at least one methacrylate, acrylate or other polymerizable group and also one reactive hydroxyl group, or primary or secondary amino group, (2) 4-methacryloxy-ethyltrimelliticanhydride and its dicarboxylic acid hydrolysis derivative, and (3) other compounds containing at least one group or moiety capable of free radical polymerization and at least one aromatic ring or moiety containing electron-withdrawing substituents that do not interfere with free radical polymerization, in the presence of a solvent, wherein the solvent comprises between 0 and 99.9% of the liquid. Alternative embodiments are also set forth.

31 Claims, No Drawings